

AMENDMENTS TO THE CLAIMS

In the Claims:

The following listing of claims replaces all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently Amended) A method of freezing food for later thawing and use, said method comprising steps of:
 packing the food product in a sealed container for freezing;
 cooling the food product substantially throughout the bulk thereof to approximately 10°C to 0°C in approximately 1 to 10 minutes; and
 cooling the food product substantially throughout the bulk thereof to approximately 0°C to -10°C in approximately 10 to 40 minutes;
 wherein said cooling steps comprise placing the food product in a calorie exchange relationship with circulating air and dry ice in a high calorie exchange cooling unit.

2. (Original) The method as recited in claim 1, wherein the food product is cooled to approximately 6°C to 0°C in approximately 1 to 10 minutes.

3. (Original) The method as recited in claim 1, wherein the food product is cooled to approximately 0°C to -7°C in approximately 10 to 40 minutes.

4. (Original) The method as recited in claim 1, wherein the food product is cooled to approximately 10°C to 0°C in approximately 3 to 5 minutes.

5. (Original) The method as recited in claim 1, wherein the food product is cooled to approximately 0°C to -10°C in approximately 15 to 30 minutes.

6. (Original) The method as recited in claim 3, wherein the food product is cooled to approximately 0°C to -7°C in approximately 15 to 30 minutes.

7. (Original) The method as recited in claim 2, wherein the food product is cooled to approximately 6°C to 0°C in approximately 3 to 5 minutes.

8. (Original) The method as recited in claim 1, wherein cooling step (2) is performed at a substantially steady rate.

9. (Original) The method as recited in claim 1, wherein said food product is sushi.

10. (Cancelled)

11. (Original) The method as recited in claim 1, wherein said packing step includes vacuum bagging said food product.

12. (Currently Amended) The method as recited in claim 1, wherein the high calorie exchange cooling unit is a freezer having an ambient temperature of approximately -40°C to -70°C and a variable cooling feather and the cooling step (2) includes steps of:

(a) placing the food product ~~after it is packaged~~ into ~~[[a]]~~ the freezer having an ambient temperature of approximately -40°C to -70°C and a variable cooling feature;

(b) adjusting said variable cooling feature to ensure the food product is cooled substantially throughout the bulk thereof from about 10°C to about -10°C in less than approximately 40 minutes; and

(c) removing said food product from said freezer after the temperature of said food product reaches a predetermined temperature that is lower than approximately -10°C.

13. (Original) The method as recited in claim 12, wherein the adjusting step (b) includes controlling a circulation of air within said freezer.

14. (Original) The method as recited in claim 12, wherein the adjusting step (b) includes directing a supply of liquid carbon dioxide into said freezer.

15. (Original) The method as recited in claim 12, wherein the adjusting step (b) includes controlling an incident angle between dry ice in said freezer and a circulation of air within said freezer.

16. (Original) The method as recited in claim 14, wherein the supply of liquid carbon dioxide is terminated when the temperature of said food product reaches approximately -5°C - 7°C.

17. (Currently Amended) A method of freezing a food product, said method comprising steps of:

(1) packaging a food product to be frozen after a temperature of said food product reaches a first predetermined temperature;

(2) cooling said food product until the temperature of said food product reaches a second predetermined temperature; and

(3) cooling said food product so that the temperature of said food product decreases from said second predetermined temperature to a third predetermined temperature within a first predetermined period of time;

wherein said cooling steps comprise placing said food product in a calorie exchange relationship with circulating air and dry ice in a high calorie exchange cooling unit.

18. (Original) The method as recited in claim 17, wherein said second predetermined temperature and said third predetermined temperature are selected to define a temperature range

wherein said food product is subject to at least one of accelerated aging and maximum ice crystallization generation.

19. (Original) The method as recited in claim 17, wherein said first period of time is selected to minimize at least one of aging and ice crystallization generation of said food product during said cooling step (3).

20. (Original) The method as recited in claim 17, wherein a fourth predetermined temperature is selected between said second and third predetermined temperatures such that said second and fourth predetermined temperatures define a temperature range wherein said food product is subject to accelerated aging and the third and fourth predetermined temperatures define a temperature range wherein said food product is subject to maximum ice crystallization generation, said first period of time is divided into second and third periods of time, said second period of time corresponding to the amount of time the temperature of said food product will be within said temperature range wherein said food product is subject to accelerated aging, said third period of time corresponding to the amount of time the temperature of said food product will be within said temperature range wherein said food product is subject to maximum ice crystallization generation, and said second and third periods of time are selected to minimize respective aging and ice crystallization generation of said food product during said cooling step (3).

21. (Original) The method as recited in claim 17, wherein said first predetermined temperature is approximately 15°C to 40°C.

22. (Original) The method as recited in claim 17, wherein said second predetermined temperature is approximately 10°C to 0°C.

23. (Original) The method as recited in claim 17, wherein said third predetermined temperature is approximately 0°C to -10°C.

24. (Original) The method as recited in claim 17, wherein said first predetermined period of time is approximately 10 to 40 minutes.

25. (Original) The method as recited in claim 22, wherein said second predetermined temperature is approximately 6°C to 0°C.

26. (Original) The method as recited in claim 23, wherein said third predetermined temperature is approximately 0°C to -7°C.

27. (Original) The method as recited in claim 24, wherein said first predetermined period of time is approximately 15 to 30 minutes.

28. (Original) The method as recited in claim 17, wherein said second predetermined temperature is reached in approximately 1 to 10 minutes.

29. (Original) The method as recited in claim 28, wherein said second predetermined temperature is reached in approximately 3 to 5 minutes.

30. (Withdrawn) A system for freezing food, comprising:
a first freezer maintaining an interior temperature set to a first temperature and including a first cooling unit and a adjustable cooling unit providing additional cooling energy; and
a control unit coupled with said first cooling unit and said adjustable cooling unit and configured to adjust the cooling energy of said adjustable cooling unit.

31. (Withdrawn) The system as recited in claim 30, wherein said control unit is configured to adjust said adjustable cooling unit to cool a food product placed within said first freezer substantially throughout the bulk thereof from about 10°C to about -10°C in approximately 40 minutes.

32. (Withdrawn) The system as recited in claim 31, wherein said control unit is configured to adjust said adjustable cooling unit to cool said food product at a substantially steady rate.

33. (Withdrawn) The system as recited in claim 30, wherein said control unit is configured to adjust said first cooling unit and said adjustable cooling unit to cool said food product substantially throughout the bulk thereof from approximately 10°C to 0°C in approximately 1 to 10 minutes.

34. (Withdrawn) The system as recited in claim 30, wherein said control unit is configured to adjust said first cooling unit and said adjustable cooling unit to cool said food product substantially throughout the bulk thereof from approximately 0°C to -10°C in approximately 10 to 40 minutes.

35. (Withdrawn) The system as recited in claim 30, wherein said control unit is configured to adjust said first cooling unit and said adjustable cooling unit to cool said food product substantially throughout the bulk thereof from approximately 0°C to -6°C in approximately 15 to 30 minutes.

36. (Withdrawn) The system as recited in claim 30, wherein said food product is vacuum packed sushi in the form of rolls.

37. (Withdrawn) The system as recited in claim 30, wherein said adjustable cooling unit includes fans for controlling a circulation of air within said second freezer.

38. (Withdrawn, previously presented) The system as recited in claim 30, wherein said first cooling unit includes at least one dry ice block.

39. (Withdrawn, previously presented) The system as recited in claim 30, further comprising at least one temperature sensor disposed within said first freezer and communicating with said control unit.

40. (Withdrawn) The system as recited in claim 39, wherein said at least one temperature sensor measures a surface temperature of food to be frozen placed inside of said first freezer, and said control unit is configured to adjust said variable cooling in response to said surface temperature.

41. (Withdrawn) The system as recited in claim 39, wherein said at least one temperature sensor measures an environment temperature of said first freezer, and said control unit is configured to adjust said variable cooling in response to said environment temperature.

42. (Withdrawn) The system as recited in claim 39, wherein said at least one temperature sensor measures a core temperature of food to be frozen, and said control unit is configured to adjust said variable cooling in response to said core temperature.

43. (Withdrawn) The system as recited in claim 30, wherein said adjustable cooling unit includes at least one liquid carbon dioxide injection unit.

44. (Withdrawn) The system as recited in claim 30, wherein said adjustable cooling unit includes at least one liquid nitrogen injection unit.

45. (Withdrawn) The system as recited in claim 30, further comprising a load lock mechanism for preventing loss of cooling energy during loading and unloading of food to be frozen.

46. (Withdrawn) The system as recited in claim 30, further comprising a second freezer encasing said first freezer, and wherein the interior temperature of said second freezer is maintained to prevent loss of cooling energy in said first freezer during loading and unloading of food to be frozen.

47. (Withdrawn) The system as recited in claim 45, further comprising a conveyor structure for continuous loading and unload of food to be frozen is said freezer.

48. (Withdrawn) A method of thawing frozen food, comprising steps of:
placing a coolant source on a side of said frozen food; and
supplying a heat source to a side of said frozen food opposite of said coolant source until said food is thawed to a desired temperature.

49. (Withdrawn) The method recited in claim 48, wherein said food is sushi.

50. (Withdrawn) The method recited in claim 49, wherein said coolant source is placed on a topping side of said sushi, said heat source is applied to a bottom side until rice of said sushi is heated to a predetermined temperature.

51. (Withdrawn) The method recited in claim 48, wherein said coolant source is a flexible package containing water.

52. (Withdrawn) The method recited in claim 48, wherein said coolant source is a flexible package containing a gel.

53. (Withdrawn) The method recited in claim 48, wherein heat source is steam.

54. (Withdrawn) The method recited in claim 48, wherein heat source is warm water.

55. (Withdrawn) A method of thawing frozen food, comprising steps of:
arranging a plurality of containers of frozen food in a tray;
placing a coolant source on a side of each of said frozen food; and
supplying a source of warm water to said tray until said plurality of containers of frozen food is thawed to a desired temperature.

56. (Withdrawn) The method recited in claim 55, wherein said frozen food is placed in a tray having three side walls and a fourth side, and wherein said fourth side has no sidewalls and provides drainage for said water source.

57. (Withdrawn) The method recited in claim 55, wherein said food is sushi.

58. (Withdrawn) The method recited in claim 57, wherein said coolant source is placed on a topping side of said sushi, and said water source thaws the bottom side of said sushi until rice of said sushi is heated to a predetermined temperature.

59. (Withdrawn) The method recited in claim 55, wherein said coolant source is a flexible package containing water.

60. (Withdrawn) The method recited in claim 55, wherein said coolant source is a flexible package containing a gel.

61. (Withdrawn) The method recited in claim 58, wherein a level of water in said tray from said water source is maintained at a level below a top of each of said plurality of containers of frozen food.

62. (Withdrawn) The method recited in claim 61, wherein the level of water in said tray from said water source is maintained at a level which does not contact the topping side of said sushi.

63. (Withdrawn) The method recited in claim 55, wherein said frozen food is placed in a tray having four side walls, and wherein the water is contained within said four side walls.

64. (Previously Presented) The method of claim 1, wherein the packing step includes de-aeration.

65. (Previously Presented) The method of claim 1, wherein the packing step includes vacuum bagging.

66. (Previously Presented) The method of claim 1, wherein the packing step includes shrink wrapping.

67. (Previously Presented) The method of claim 17, wherein the packaging step includes packaging in a sealed container.

68. (Previously Presented) The method of claim 67, wherein the packaging step includes de-aeration.

69. (Previously Presented) The method of claim 67, wherein the packaging step includes vacuum bagging.

70. (Previously Presented) The method of claim 67, wherein the packaging step includes shrink wrapping.